AD_____

Award Number:
W81XWH-09-1-0636

TITLE:
Developing an Instrument to Measure Socioeconomic Disparities in Quality of Care for Men with Early Stage Prostate Cancer

PRINCIPAL INVESTIGATOR:
Theresa Koppie, M.D.

CONTRACTING ORGANIZATION:
University of California, Davis
Sacramento, CA 95817

REPORT DATE:
September 2010

TYPE OF REPORT:
Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT:

X Approved for public release; distribution unlimited

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
01-09-2010	Annual Summary	1 SEP 2009 - 31 AUG 2010

4. TITLE AND SUBTITLE **Developing an Instrument to Measure Socioeconomic Disparities in Quality of Care for Men with Early Stage Prostate Cancer**

5a. CONTRACT NUMBER

5b. GRANT NUMBER
W81XWH-09-1-0636

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Theresa Koppie, M.D

.

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

University of California, Davis

Sacramento, CA 95817

8. PERFORMING ORGANIZATION REPORT NUMBER

-

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and
Material Command
Fort Detrick, MD 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for Public Release

13. SUPPLEMENTARY NOTES

14. ABSTRACT Patients with early stage prostate cancer have excellent cause specific survival after definitive local therapy with radiation therapy or radical prostatectomy. However, regardless of race, men of lower socioeconomic status are less likely to receive definitive local therapy for early stage disease, and when such treatment is administered, they are more likely to die of their cancer. Men of lower socioeconomic status are also more likely to have treatment related complications after prostate cancer treatment. This suggests that disparities in treatment, rather than prostate cancer screening, may play a causative role in observed differences.

• Hypothesis: Socioeconomic disparities in prostate cancer survival are associated with distinct differences in quality of care. These distinct patterns can be identified and measured using standard medical diagnosis and treatment codes.

• Specific Aims:

1. To identify socioeconomic disparities in outcomes after treatment for localized prostate cancer.
2. To identify socioeconomic disparities in quality of care for localized prostate cancer.
3. To develop a tool to measure disparities in quality of care for localized prostate cancer.

15. SUBJECT TERMS
Prostate cancer, socioeconomic, disparities

16. SECURITY CLASSIFICATION OF: U			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USAMRMC
U	U	U	UU	14	19b. TELEPHONE NUMBER *(include area code)*

Table of Contents

Page

INTRODUCTION:

Patients with early stage prostate cancer have excellent cause specific survival after definitive local therapy with radiation therapy or radical prostatectomy. However, regardless of race, men of lower socioeconomic status are less likely to receive definitive local therapy for early stage disease, and when such treatment is administered, they are more likely to die of their cancer. Men of lower socioeconomic status are also more likely to have treatment related complications after prostate cancer treatment. This suggests that disparities in treatment, rather than prostate cancer screening, may play a causative role in observed differences. We hypothesize that socioeconomic disparities in prostate cancer survival are associated with distinct differences in quality of care that can be identified and measured using standard medical diagnosis and treatment codes. Therefore, our aims are 1. to identify socioeconomic disparities in outcomes after treatment for localized prostate cancer, 2. to identify socioeconomic disparities in quality of care for localized prostate cancer and 3. To develop a tool to measure disparities in quality of care for localized prostate cancer.

BODY:

In this section of the report, I am to describe the research accomplishments associated with each task outlined in the approved Statement of Work. I have copied my approved statement of work below. As planned, I am currently in the data organization period of work, and do not as of yet have data analysis or results to present.

STATEMENT OF WORK

Phase I: Institutional and SEER clearance.
Months 0-6
Outcome: Approval for the study. Obtain data for the study.

Task 1. Obtain Institutional Review Board (IRB) Approvals (Months 0-6).
Task 2. Obtain data from SEER Medicare databases. Submit 10 page online proposal to the SEER Medicare program. The approval process takes approximately 6 weeks. Once approved, we can then purchase SEER Medicare linked data.

Phase II: Data organization and cleaning.
Months 6-24
Outcome: Data suitable for statistical analysis

Task 1. Programming to develop variables of interest from billing codes.
Task 2. Evaluate variables of interest. Check for internal consistency. Exclude invalid fields where appropriate.

As stated in Phase I, we have obtained IRB approvals as well as access to the SEER Medicare linked dataset. The IRB approval process took approximately 3 months. We sought access to SEER Medicare linked data concurrently. This took over 6 months to achieve due to staffing shortages at the NCI, and we have recently received the data. During this interval we also sought appropriate statistical support. With the help of grant funds, we are providing partial salary support to a recent PhD from our department of biostatistics and epidemiology, Clayton Schupp. On a personal note, I was on maternity leave from May to September, and had sought DOD approval for leave during this period.

As for Phase II of our statement of work, our first look at the dataset demonstrates that there will be a significant amount of work required to evaluate and clean the dataset for analysis. (Table 1) There are many cases for which variables are unknown that will need to be explored within the SEER dataset. In addition, significant programming will be required to score comorbidities,

evaluate socioeconomic status from census and zip code data, and organize PSA (prostate specific antigen) data for potential use. We will then begin the process of linking to the medicare dataset, where billable clinical activities around the time of diagnosis and treatment can be assessed. Using billing codes and coding tables that I have defined previously (Appendix ii, Appendix iii), we can begin our analysis.

KEY RESEARCH ACCOMPLISHMENTS:

- "Men of higher socioeconomic status have improved outcomes after radical prostatectomy for localized prostate cancer" Nicholas J. Hellenthal[1], Arti Parikh-Patel[2], Katrina Bauer[2], Ralph W. deVere White[1], Theresa M. Koppie[1] was accepted for publication in the journal, Urology. (See Appendix i)

REPORTABLE OUTCOMES:

1. We have completed and submitted a manuscript for publication in the journal, Urology. This manuscript has been accepted for publication in upcoming months: "Men of higher socioeconomic status have improved outcomes after radical prostatectomy for localized prostate cancer" Nicholas J. Hellenthal[1], Arti Parikh-Patel[2], Katrina Bauer[2], Ralph W. deVere White[1], Theresa M. Koppie[1]

2. We have developed a SEER medicare linked database for men of medicare age who are diagnosed with prostate cancer. This database includes patient demographics, cancer staging, cancer treatment information, cancer specific survival, as well as all medicare billing during the course of their treatment.

3. An abstract has been submitted to the 2011 IMPACT meeting: PC081735, Developing an Instrument to Measure Socioeconomic Disparities in Quality of Care for Men with Early-Stage Prostate Cancer

4. Collaboration with Sergio Aguilar-Gaxiola, Director of the Center to Reduce Health Disparities at UC Davis School of Medicine on psychosocial disparities for men with erectile dysfunction after prostate cancer treatment.

5. Collaboration with Moon Chen, PhD, MPH, Associate Director for Disparities and Research at UC Davis relating to prostate cancer in Asian American men.

6. Development of a Health Disparities Conference, scheduled for February 2011, where Carmen Moten, Program Director/Health Scientist Administrator in the Disparities Training Branch, Center to Reduce Cancer Health Disparities (CRCHD) of the National Cancer Institute (NCI) will guest lecture on health disparities.

CONCLUSION: To date, we have obtained our data and are working to identify, clarify and develop variables for analysis. I look forward to the continuing development of our work and hope to report meaningful results with the next annual review.

REFERENCES:

Nicholas J. Hellenthal, Arti Parikh-Patel, Katrina Bauer, W. Ralph, White deVere, and Theresa M. Koppie, Men of Higher Socioeconomic Status Have Improved Outcomes After Radical Prostatectomy for Localized Prostate Cancer, Urology, 2010 (Article in press)

APPENDICES:

Appendix i. "Men of higher socioeconomic status have improved outcomes after radical prostatectomy for localized prostate cancer", accepted for publication in Urology.

Appendix ii. ICD-9, CPT-4, and HCPCS Codes to assess outcome after prostate cancer treatment.

Appendix iii. ICD-9, CPT-4, and HCPCS Codes to quality of care for prostate cancer.

PERSONNEL:

Theresa Koppie, MD – Principal Investigator
Clayton Schupp, PhD – Graduate Student Researcher advanced to Postdoctoral Scholar

SUPPORTING DATA:

Table 1. Clinical characteristics of patients with prostate cancer identified from the SEER dataset.

Clinical Characteristics		n
Age	65-69	52456
	70-74	50680
	75-79	40214
	80-84	22039
	85+	12279
Race	White	142814
	Black	19251
	Asian	6137
	Hispanic	4482
	Native American	374
	Other	4610
Marital Status	Single	12145
	Married	120442
	Separated	1014
	Divorced	8460
	Widowed	16162
	Unknown	19445
Grade	1	4809
	2	106243
	3	54591
	4	575
	Unknown	11450
Stage	T1	1300
	T2	10929
	T3	5004
	T4	9097
	Unknown	151338

Men of Higher Socioeconomic Status Have Improved Outcomes After Radical Prostatectomy for Localized Prostate Cancer

Nicholas J. Hellenthal, Arti Parikh-Patel, Katrina Bauer, W. Ralph, White deVere, and Theresa M. Koppie

OBJECTIVE We sought to evaluate the impact of socioeconomic status (SES) on the likelihood of undergoing radical prostatectomy (RP) or external beam radiation therapy (XRT) and the ensuing effect on cancer-specific survival (CSS) after treatment for men with low-risk prostate cancer.

METHODS Using the California Cancer Registry database, we identified 123,953 men diagnosed with localized, Gleason ≤7 prostate cancer from 1996 to 2005. Patients were separated into quintiles based on socioeconomic status and were stratified by race, age, year of diagnosis, and treatment. Logistic regression and Kaplan-Meier analyses were used to determine the likelihood of undergoing RP or XRT and cancer-specific survival.

RESULTS In the final cohort, 39,234 patients (31.7%) and 42,431 patients (34.3%) underwent RP and XRT as initial therapy. Men of lower SES were less likely to undergo RP or XRT. Men undergoing RP in the lowest SES were twice as likely to die of prostate cancer (HR 1.99, 95% CI 1.28-3.09, $P = .002$) than men in the highest SES. This difference was even more profound when adjusted for race (HR 2.20, 95% CI 1.38-3.50, $P = .001$). Similarly, men in the lowest SES who underwent XRT were also approximately twice as likely to die of prostate cancer (HR 2.24, 95% CI 1.71-2.94, $P < .001$) than men of the highest SES, regardless of race.

CONCLUSIONS Men of lower SES are less likely to undergo RP or XRT for the management of localized prostate cancer. After RP or XRT, men of lower SES have a decreased cancer-specific survival compared with men of higher SES. UROLOGY xx: xxx, xxxx. © 2010 Published by Elsevier Inc.

Prostate cancer exhibits the largest differences in incidence and survival among races and ethnicities of any cancer site.[1] Meta-analyses have shown an approximately 13% increased risk of prostate cancer–specific death in African Americans when compared with whites after adjusting for clinical predictors.[2] There are numerous theories about why the mortality rates are higher in minority groups, including differences in tumor aggressiveness and stage at diagnosis, treatment, socioeconomic factors, patient beliefs, and physician biases.[1] To date, the cause of the disparities in incidence and survival remain unknown.

Differences in the outcomes of men with prostate cancer also persist with regards to socioeconomic status (SES). In one large, community-based series, it was found that men age 65 years or older living in the lowest socioeconomic quartile were 31% more likely to die of local or regional-staged prostate cancer than those in the highest quartile.[3] This is at least partially attributed to the fact that SES, and income in particular, has been associated using watchful waiting rather than surgery or radiation in men with low-risk prostate cancer.[4]

Although there is a large amount of literature concerning the relationships of race and socioeconomic status to prostate cancer–specific treatment and survival, the roles that these factors play in cancer-specific survival after treatment have not been addressed. Using a statewide database, we primarily sought to evaluate the impact of SES on the likelihood of undergoing radical prostatectomy (RP) and the ensuing effect on cancer-specific survival (CSS) after surgery for men with low-risk (Gleason ≤7) localized prostate cancer. Secondarily, we determined the impact of SES on the likelihood of undergoing external beam radiotherapy (XRT) and the ensuing effect on CSS after therapy for men with low-risk localized disease.

MATERIAL AND METHODS

Subjects and Databases

We used the California Cancer Registry (CCR) database, a statewide prospective cancer registry maintained by the California Department of Health Services that captured approximately 99% of the state's population from the years 1988-2005.[5]

From the Department of Urology, University of California, Davis Medical Center, Sacramento, California; and the California Cancer Registry, Sacramento, California

Reprint requests: Nicholas J. Hellenthal, M.D., Department of Urology, UC Davis Medical Center, 4860 Y Street, Suite 3500, Sacramento, CA 95817. E-mail: nicholas.hellenthal@ucdmc.ucdavis.edu

0090-4295/xx/$34.00
doi:10.1016/j.urology.2010.03.024

Table 1. Descriptive table for low-grade, localized prostate cancer cases, 1996-2005

	n	%
Year of diagnosis		
1996-98	36,403	29.4
1999-2001	41,344	33.3
2002-05	46,206	37.3
Age (years)		
18-60	28,591	23.1
61-65	21,488	17.3
66-70	25,657	20.7
71-75	23,768	19.2
76+	24,449	19.7
Race		
White	86,109	69.5
African American	10,229	8.3
Hispanic	15,200	12.3
Asian-Pacific Islander	7,098	5.7
Other/Unknown	5,317	4.3
SES		
SES1—low	14,072	11.4
SES2	20,145	16.3
SES3	25,134	20.3
SES4	28,520	23.0
SES5—high	36,082	29.1
Treatment*		
Radical prostatectomy	39,234	31.7
Radiation	42,431	34.2
Neither	42,288	34.1
Total	123,953	

* Treatment categories are mutually exclusive.

Population

All prostate cancer cases between 1996 and 2005 were identified. Patients were excluded if Gleason score on prostate biopsy was >7 or if disease was not clinically localized to the prostate at the time of diagnosis. The measure of SES used in this analysis was a composite measure previously created by Yost et al using CCR and census data.[6] Census files were linked to the CCR file based on the cases' block group of residence at the time of diagnosis. Cases that were not able to be geocoded to a street address (5.5% of cases) were randomly allocated to census blocks within their county of residence. Cases diagnosed from 1996 forward were linked to 2000 census data. Principal components analysis was then used to create a composite SES score using several census variables, including median household income, education level, proportion below 200% poverty level, and median house value. Quintiles of SES score were used in the analysis, with a value of 1 representing the lowest SES level and a value of 5 representing the highest SES level. Table 1 illustrates the demographic characteristics of the study population.

Variables

For each identified case, data regarding race, age, year of diagnosis, and treatment type were abstracted. All analyses used the American Joint Committee on Cancer (AJCC) TNM staging system related to time of diagnosis.

The CCR database classifies race as white, African American, Hispanic, Asian-Pacific Islander, or other; and treatment type as radical prostatectomy, other surgery, radiation, chemotherapy, hormone therapy, other therapy, or no therapy. We defined radical prostatectomy solely as radical prostatectomy with or without lymphadenectomy.

Statistical Analysis

Descriptive statistics were used to summarize the demographic characteristics of the study population. Bivariate analyses were conducted to examine the relationships between: (1) SES and radiation therapy and (2) SES and radical prostatectomy, stratified by the following variables: year of diagnosis, race, and age group. Mantel-Haenszel odds ratios and their 95% confidence intervals were generated. For the survival analyses, our outcome of interest was death resulting from prostate cancer; deaths from other causes were censored at the time of death. Cause of death was categorized according to the International Classification of Diseases system. Cases with ICD-9 cause of death code 185 and those with ICD-10 cause of death code C61 were designated as having died of prostate cancer. Unadjusted survival curves by SES were produced using the Kaplan-Meier method. Cox proportional hazards models were generated to examine the effect of SES on survival from prostate cancer. Two separate models were produced, one for patients who received radiation therapy and another for those who underwent radical prostatectomy. The models were adjusted for age and race/ethnicity. Log-log plots were used to test the proportionality assumption of the model. No violations of this assumption were found upon examination of these plots. SAS 9.1 software was used for all analyses (SAS Institute, Inc., Cary, NC).

RESULTS

Between January 1996 and December 2005, we identified 39,234 patients (31.7% of total) who underwent radical prostatectomy (RP) as initial therapy for clinically localized, Gleason ≤7 prostate cancer (Table 1). Over the same time frame, we identified 42,431 men (34.2%) who underwent XRT as initial therapy for the same disease. Patients in the study ranged in age from 34-104 years (mean, 67 years), and median follow-up was 53 months (range, 0-119). Five-hundred seventy-three men (0.5%) died of prostate cancer in the radiation group, and 210 patients (0.2%) died of prostate cancer in the RP group. Median survival was 51 and 64 months in those who received RP and XRT, respectively.

Men of lower SES who underwent RP had a higher odds of cancer-specific death over the time frame studied (Table 2A). In fact, men of the lowest socioeconomic status were 2.0 times more likely to die of prostate cancer than their counterparts in the highest SES after RP (95% CI 1.28-3.09, $P = .002$). When adjusted for race, the differences were even more disparate as patients in the lowest SES were 2.20 times more likely to die of prostate cancer than the highest SES (95% CI 1.38-3.50, $P = .001$). These results are displayed graphically in Fig. 1.

Similarly, men of lower SES who underwent XRT had a significantly higher risk of prostate cancer–specific death (Table 2B). Men of the lowest socioeconomic status were 2.24 times more likely to die of prostate cancer than those in the highest SES after radiation (95% CI 1.71-2.94, $P < .001$). The differences were comparable when adjusted for race, with those of the lowest SES being 2.21 times more likely to die of prostate cancer (95% CI 1.66-2.95, $P < .001$). These results are displayed graphically in Fig. 2.

Table 2. Prostate cancer–specific survival in **(A)** patients undergoing radical prostatectomy and **(B)** patients receiving XRT for low-grade, localized prostate cancer

Quintile of SES	Percent of Patients	Unadjusted HR (95% CI)	*P* Value	Race* and Age Adjusted HR (95% CI)	*P* Value
A.					
SES1	**9.7**	**1.99 (1.28-3.09)**	**.002**	**2.20 (1.38-3.50)**	**.001**
SES2	**15.0**	**1.53 (1.01-2.31)**	**.042**	**1.57 (1.04-2.39)**	**.034**
SES3	**19.3**	**1.49 (1.01-2.19)**	**.045**	**1.49 (1.01-2.20)**	**.045**
SES4	23.5	0.94 (0.62-1.42)	.757	0.93 (0.61-1.41)	.732
SES5	32.5	Reference 1.0		Reference 1.0	
B.					
SES1	**10.0**	**2.24 (1.71-2.94)**	**<.001**	**2.21 (1.66-2.95)**	**<.001**
SES2	**15.6**	**1.57 (1.22-2.04)**	**<.001**	**1.50 (1.15-1.96)**	**.003**
SES3	**20.7**	**1.60 (1.26-2.03)**	**<.001**	**1.55 (1.22-1.97)**	**<.001**
SES4	23.6	1.13 (0.88-1.45)	.335	1.12 (0.87-1.44)	.371
SES5	30.1	Reference 1.0		Reference 1.0	

Hazard ratios are listed with associated *P* values. Statistically significant values are bold. Statistical significance was achieved when the 95% CI did not cross 1.0.

* Excludes race other than non-Hispanic white, non-Hispanic black, Hispanic, Asian-Pacific Islander.

(Source, California Cancer Registry http://www.ccrcal.org). California Dep Publ Healthc Cancer Surveill Res Branch, April;2008:1988, released April 2008.

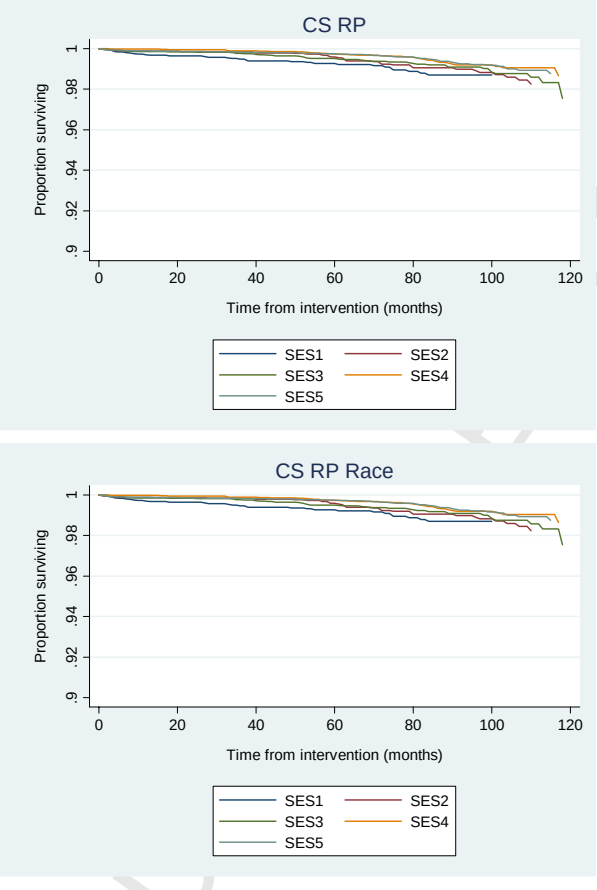

Figure 1. Cancer-specific survival in patients undergoing RP for low-grade, localized prostate cancer: **(A)** unadjusted and **(B)** adjusted for race.

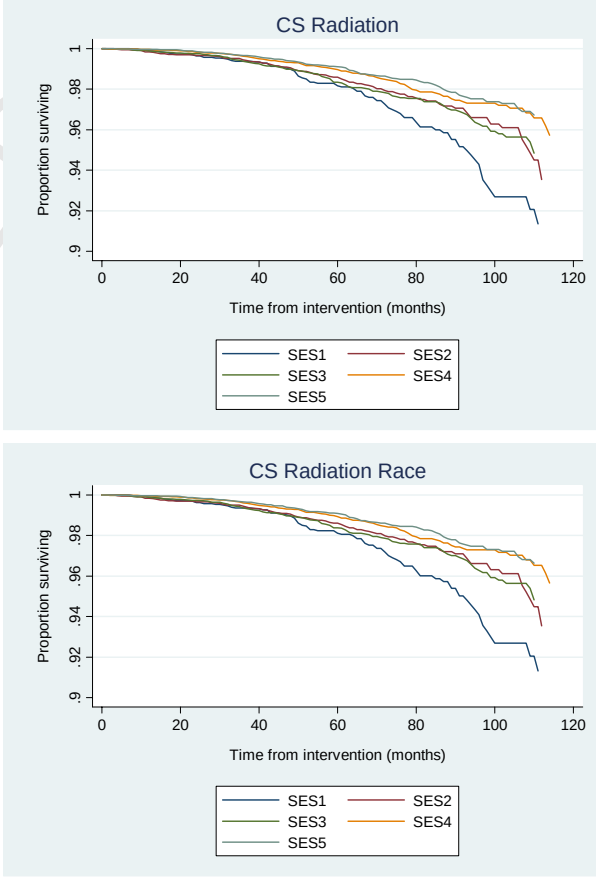

Figure 2. Cancer-specific survival in patients receiving XRT for low-grade, localized prostate cancer: **(A)** unadjusted and **(B)** adjusted for race.

The effects of SES on treatment with XRT or RP remained despite year of diagnosis (and treatment), race, and age at diagnosis (not shown). In general, men of lower SES were less likely to receive prostatectomy or XRT regardless of year of diagnosis, race, and 5-year age group over 60 years. Men in the lowest SES were roughly 40% less likely to undergo prostatectomy and 30% less likely to receive radiation than those in the highest SES for each breakdown in year of diagnosis, age, and race (not shown).

COMMENT

Prostate cancer is a disease that exhibits profound racial and social disparities in regards to incidence, treatment, and outcome.[7] Prior studies have documented differences of approximately 13% in prostate cancer–specific survival, favoring whites over African Americans, although other studies have demonstrated that racial difference in survival was completely eliminated after further adjustment for tumor grade, socioeconomic status, and year of diagnosis.[7] We sought to examine the relationship between SES and treatment administered as well as prostate cancer–specific survival after definitive treatment (XRT or RP) in patients with low-risk prostate cancer.

Our results show that men of lower SES are half as likely to undergo radical prostatectomy for low-risk disease than those of higher SES. When adjusted for race, the difference was even more profound. This is despite the fact that men of lower SES have been found to be much more likely to be diagnosed with localized prostate cancer.[8] The reasoning behind this is likely multifactorial. Income level has been shown to be an independent predictor of prostatectomy, with lower income patients demonstrating a decreased likelihood of choosing surgery.[4] The disparity in treatment may be a result of patient-driven factors, such as work-related or financial stressors, and poor access to centers that offer prostatectomy.[9] This may also be due to physician factors, namely financial or other disincentives to offer prostatectomy to patients of lower SES. Finally, comorbidities may play a large factor in treatment selection, both for patients and physicians.

Racial disparities in surgical care have not been limited to prostate cancer. Studies have demonstrated that disparities exist in the treatment of esophageal and cervical cancers, with African Americans being less likely to undergo appropriate surgical intervention than their white counterparts.[10] This may be caused in part by health care access, but distrust in the health care system, and surgical intervention in particular, also likely plays a role.[11]

Despite treatment choice, we also found that men of lower SES who underwent either RP or radiation treatment for low-risk prostate cancer were approximately twice as likely to die of prostate cancer than their higher SES counterparts. Although the absolute numbers of men dying of low-risk disease were low, the differences attributed to SES were significant. Patients generally do well after definitive local treatment for low-risk prostate cancer; however disease-free outcome has been linked to variations in technique. Studies have demonstrated that positive surgical margins, a quality-control indicator in prostatectomy, affect disease-free survival after surgery, even in low-risk disease.[12] Similarly, when it comes to definitive radiation therapy, administrative technique and dosimetry, both independent quality indicators, are known to predict biochemical failure and the likelihood of developing distant metastases.[13,14]

The differences with regards to cancer-specific survival among the higher and lower SES quartiles after definitive therapy may also be a result of clinical factors not detected in the CCR dataset. These variables include initial prostate-specific antigen and biopsy tumor burden, neither of which were incorporated into the dataset used. The slight survival differences may also be attributable to variations in the initial treatments or techniques available to patients of lower SES. Finally, another potential factor lies in the fact that men of higher SES may receive more thorough post-treatment surveillance than men of lower SES.

This study does have limitations. As previously mentioned, the CCR database does not include information on surgical margin status or dosimetry and technique of radiation administered—key components of disease-free survival. There is also no data regarding PSA status or initial tumor volume in the CCR dataset. Thus, some of the patients may not have truly been "low-risk" by strict criteria. Comorbidites are also not accounted for, because these may play into treatment choices and post-treatment outcomes. Finally, as with any large database analysis, there exists the possibility of data entry miscoding. This potential error, however, should be nonselective over the cohort analyzed, and in effect, cancel out any overt bias.

This study has demonstrated that, in the setting of low-risk disease, men of lower SES are less likely to have definitive local therapy. Moreover, men of lower SES have decreased disease-specific survival even when treated definitively for low-risk prostate cancer. These findings point to the need for improvement in prostate cancer screening and treatment for men of lower SES.

CONCLUSIONS

Men of lower SES are less likely to undergo RP or XRT for the management of localized prostate cancer. After RP or XRT, men of lower SES experience a decreased cancer-specific survival compared with men of higher SES.

References

1. Jemal A, Clegg LX, Ward E, et al. Annual report to the nation on the status of cancer, 1975-2001, with a special feature regarding survival. *Cancer*. 2004;101:3-27.
2. Evans S, Metcalfe C, Ibrahim F, et al. Investigating Black-White differences in prostate cancer prognosis: A systematic review and meta-analysis. *Int J Cancer*. 2008;123:430-435.
3. Du XL, Fang S, Coker AL, et al. Racial disparity and socioeconomic status in association with survival in older men with local/regional stage prostate carcinoma: findings from a large community-based cohort. *Cancer*. 2006;106:1276-1285.
4. Krupski TL, Kwan L, Afifi AA, et al. Geographic and socioeconomic variation in the treatment of prostate cancer. *J Clin Oncol*. 2005;23:7881-7888.
5. California Cancer Registry http.//www.ccrcal.org). *CdoPH Cancer Surveill Res Branch*, April;**2008:**1988, released April 2008.
6. Yost K, Perkins C, Cohen R, et al. Socioeconomic status and breast cancer incidence in California for different race/ethnic groups. *Cancer Causes Control*. 2001;12:703-711.

7. Robbins AS, Yin D, Parikh-Patel A. Differences in prognostic factors and survival among White men and Black men with prostate cancer, California, 1995-2004. *Am J Epidemiol.* 2007;166:71-78.
8. Sanderson M, Coker AL, Perez A, et al. A multilevel analysis of socioeconomic status and prostate cancer risk. *Ann Epidemiol.* 2006; 16:901-907.
9. Sultan R, Slova D, Thiel B, et al. Time to return to work and physical activity following open radical retropubic prostatectomy. *J Urol.* 2006;176:1420-1423.
10. Chan JK, Zhang M, Hu JM, et al. Racial disparities in surgical treatment and survival of epithelial ovarian cancer in United States. *J Surg Oncol.* 2008;97:103-107.
11. Crawley L, Payne R, Bolden J, et al. Palliative and end-of-life care in the African American community. *J Am Med Assoc.* 2000;284: 2518-2521.
12. Swindle P, Eastham JA, Ohori M, et al. Do margins matter? The prognostic significance of positive surgical margins in radical prostatectomy specimens. *J Urol.* 2005;174:903-907.
13. Kupelian PA, Ciezki J, Reddy CA, et al. Effect of increasing radiation doses on local and distant failures in patients with localized prostate cancer. *Int J Radiat Oncol Biol Phys.* 2008;71:16-22.
14. Mangar SA, Huddart RA, Parker CC, et al. Technological advances in radiotherapy for the treatment of localised prostate cancer. *Eur J Cancer.* 2005;41:908-921.

Appendix ii. ICD-9, CPT-4, and HCPCS Codes to assess outcome after prostate cancer treatment.

Radical prostatectomy: CPT: 55840 (Retropubic radical prostatectomy), 55842 (Prostatectomy, retropubic radical, with or without nerve sparing; with lymph node biopsy(s), 55845 (Retropubic radical prostatectomy with bilateral pelvic lymph node dissection), 55810 (Perineal radical prostatectomy), 55815 (Perineal radical prostatectomy with bilateral pelvic lymph node dissection), and 55866 (Laparoscopy, surgical prostatectomy, retropubic radical, including nerve sparing).

Diagnosis of Surgical Complications:
ICD-9: 599.1 (Urethral fistula), 596.1 (Intestinovesical Fistula), 596.2 (Vesical Fistula Nec), 596.6 (Bladder Rupt (Non Traumatic), 565.1 (Anal Fistula), 569.3 (Rectal Anal Hemorrhage), 569.83 (Perforation Of Intestine), 569.4 (Anal or Rectal Ulcer/Pain/Tear-Old/Disease), 998.1 (Hemorrhage or Hematoma complicating a procedure), 998.83 (Non-Healing Surgical Wound), 998.9 (Surgical Complication NOS), 998.2 (accidental puncture or laceration during a procedure), 998.3 (disruption of operative wound), 998.4 (Foreign Body left during procedure), 998.5 (Infected Post-Op Seroma/Other Infection), 998.6 (Persist Post-Op Fistula), 998.7 (Post-Op Foreign Substance Reaction), 604.0 (Orchitis with Abscess), E870.0 (Acc Cut/Hem in Surgery), E870.4 (Acc Cut/Hem with Scope Exam), E870.7 (Acc Cut/Hem with Enema), E870.8 (Accidental Cut in Med Care Nec), E870.9 (Accidental Cut in Med Care Nos), E871.0 (Post-Surgical Foreign Body), E873.0 (Excess Fluid in Infusion), E876.0 (Mismatch Blood-Transfusion), 956.0 (Injury to Sciatic Nerve), 956.1 (Injury to Femoral Nerve), 956.4 (Injury to cutaneous sensory nerve lower limb), 956.5 (Injury to nerve Pelvic/Leg), 956.8 (Injury to Multiple Nerves of Pelvic and Leg), 956.9 (Injury to Nerves in Pelvic/Leg Nos), 902.50 (Injury to Iliac Vessel Nos), 902.51 (Injury to Hypogastric Artery), 902.52 (Injury to Hypgastric Vein), 902.53 (Injury to Iliac Artery), 902.54 (Injury to Iliac Vein), 902.59 (Injury to Iliac Vessel Nec), 590.10 (Acute pyelonephritis without lesion of renal medullary necrosis), 590.80 (Pyelonephritis Nos), 590.9 (Kidney infection), 595 (Acute Cystitis), 595.0 (Acute Cystitis), 595.3 (Trigontitis), 595.89 (Cystitis Nec), 595.9 (Cystitis Nos), 599 (Urinary tract infection, site not specified), 599.0 (Urinary Tract Infection Nos), 599.00 (Urinary Tract Infection Nos), 599.1 (Uretheral Fistula), 599.2 (Uretheral Diverticulum), 599.7 (Hematuria), 996.31 (Malfunction of Uretheral Catheter), 996.64 (React-Indwell Urine Catheter), 996.65 (complication or infection due to urethral catheter), 998.5 (postoperative infection)

Diagnosis of GU Surgical Complications: 595.89 (Cystitis Nec), 590.1 (Acute Pyelonephritis), 590.2 (Renal/Perirenal Abscess), 590.8 (Pyelonephritis or pyonephrosis not specified as acute or chronic), 590.9 (Injection Of Kidney Nos), 591 (Hydronephrosis), 997.5 (Surgical Compl-Urinary Tract), 596.1 (Intestinovesical Fistula), 596.2 (Urethrovesical fistula), 596.6 6 (Rupture of bladder, nontraumatic), 593.3 (Stricture of kinking of ureter (postoperative), 593.4 (Ureteric Obstruction Nec), 593.5 (Hydroureter), 593.81 (Renal Vascular Disorder), 593.82 (Ureteral Fistula), 457.8 (NonInfection Lymph Disease), 567.2 (Peritonitis), 567.8 (Choleperitonitis/Sclerosing Mesenteritis/Peritonitis), 595.89 (Cystitis), 682.2 (Cellulitis of Trunk), 998.59 (Other Post-Op Infection)

Treatment of Urological Complications
CPT code: 36430 (Blood transfusion), 49000 (Exploratory laparotomy), 50392 (Percutaneous nephrostomy tube placement), 50780 (Ureteroneocystostomy), 51800 (Revision of bladder/urethra), 51860 (Cystorrhaphy, suture of bladder wound), 52332 (Insertion of ureteral stent)

Diagnosis of urinary incontinence: ICD-9: 599.82 (Intrinsic sphincter deficiency), 788.30 (incontinence of urine), 788.31 (urge incontinence),788.32 (stress incontinence, male), 788.33 (Mixed incontinence, male, female), and 788.34 (incontinence without sensory awareness).

Treatment of urinary incontinence: CPT codes: 51715 (Endoscopic injection of implant material into the submucosal tissues of the urethra and/or bladder neck), 95028 (Intracutaneous (intradermal) tests

with allergenic extracts, delayed type reaction, including reading), 53440 (Sling operation for correction of male urinary incontinence , fascia or synthetic), 57288 (Sling operation for stress incontinence, fascia or synthetic), 51992 (Laparoscopy, surgical; sling operation for stress incontinence, fascia or synthetic) 53442 (remove or revise male sling), 53444 (Insertion of tandem cuff (dual cuff)), 53445 (Insertion of inflatable urethral/bladder neck sphincter, including placement of pump, reservoir & cuff), 53446 (Removal of inflatable urethral/bladder neck sphincter, including pump, reservoir & cuff), 53447 (Removal & replacement of inflatable urethral/bladder neck sphincter, including pump, reservoir & cuff at same operative session), 53448 (Removal & replacement of inflatable urethral/bladder neck sphincter including pump, reservoir & cuff through an infected field at same operative session including irrigation and debridement of infected tissue), and 53449 (Repair of inflatable urethral/bladder neck sphincter, including pump, reservoir & cuff).
Diagnosis of Outlet Obstruction ICD-9 diagnosis: 596.0, 596.00 (bladder neck obstruction), 599.6 (urinary obstruction), 788.2 (retention of urine), 788.21 (incomplete bladder emptying), 788.29 (other specified retention of urine), 788.38 (overflow incontinence), 788.62 (slowing of urinary stream)
Management of Outlet Obstruction CPT code: 51701 (urethral/bladder catheterization (simple); 51010, 51040 (cystostomy), 52640, (transurethral resection of postoperative bladder neck contracture), 52276 (visual, optical internal urethrostomy), 52281 (Cystourethroscopy, with calibration and/or dilation of urethral stricture or stenosis, with or without meatotomy, with or without injection procedure for cystography, male or female), 52282 (Cystourethroscopy, with insertion of urethral stent), 52283 (Cystourethroscopy, with steroid injection into stricture), 52450 (Transurethral incision of prostate), 52500 (Transurethral resection of bladder neck (separate procedure), 52510 (Transurethral balloon dilation of the prostatic urethra, any method), 52640 (Transurethral resection; of postoperative bladder neck contracture), 53600 (Dilation of urethral stricture by passage of sound or urethral dilator, male; initial), 53601 (Dilation of urethral stricture by passage of sound or urethral dilator, male; subsequent), 53605 (Dilation of urethral stricture or vesical neck by passage of sound or urethral dilator, male, general or conduction (spinal) anesthesia), 53620 (Dilation of urethral stricture by passage of filiform and follower, male; initial), 53621 (Dilation of urethra). ICD-9: 57.92 (Dilation of bladder neck), 58.0 (Urethrotomy), 58.1 (Urethral meatotomy), 58.31 (Endoscopic excision or destruction of lesion or tissue of urethra (includes fulguration of urethral lesion), 58.39 Other local excision or destruction of lesion or tissue of urethra (includes excision of: congenital valve of urethra, lesion of urethra, stricture of urethra, urethrectomy), 58.6 Dilation of urethra (includes dilation of urethrovesical junction; passage of sounds through urethra; removal of calculus from urethra without incision), 60.95 (Transurethral balloon dilation of prostatic urethra)
Diagnosis of proctitis: 558.1 (Gastroenteritis and colitis due to radiation)
Diagnosis of cystitis: 595.x (Cystitis), 595.82 (Irradiation cystitis).
Diagnosis of hemorrhagic cystitis: 599.71 (Gross hematuria), 595.82 (Irradiation cystitis), 596.7 (Hemorrhage Into Bladder Wall)
Diagnosis of rectal hemorrhage: (569.3) (Bleeding, rectal)
Blood transfusions: CPT code: 36430, HCPCS: P9038 (Red blood cells, irradiated, each unit), P9022 (Red blood cells, washed, each unit), P9021 (Red blood cells, each unit), P9016 (Red blood cells, leukocytes reduced, each unit), P9011 (Blood (split unit), specify amount4), P9010 (Whole blood, for transfusion, per unit), C1018 (Blood, leukoreduced, irradiated, each unit), C1016 (Blood, leukoreduced, frozen/deglycerol/washed, each unit), C1010 (Blood, leukoreduced, CMV negative, each unit), P9039 (Red blood cells, deglycerolized, each unit), C1011 (Platelet, HLA-matched leukoreduced, apheresis/pheresis,each unit), P9040 (Red blood cells, leukocytes reduced, irradiated, each unit)

Appendix iii. ICD-9, CPT-4, and HCPCS Codes to quality of care for prostate cancer.
Pretreatment imaging: CPT Code: 74150 (CT abdomen w/o contrast), 74160 (CT abdomen w/contrast), 74170 (CT abdomen w/o & w/contrast), 78306 (Bone Scan, Whole Body)
Use of conformal radiotherapy treatment planning: CPT Code: 77295 (conformal planning), 77301 (IMRT Plan (after CT imaging)), G0178 (IMRT planning)
Use of high-energy (> 10 MV) photons: CPT Code: 77404-06, 77409-11or 77414-16
Use of custom immobilization during radiotherapy: CPT Code: 77334
Completion of two follow-up visits with radiation oncologist in first posttreatment year: CPT Code: 9921x, 9922x, 9923x, 9924x, 9925x, 9938x, 9939x
Consultation with a urologist or radiation oncologist: CPT Code: 9920x, 9924x
GnRH Agonists: HCPCS codes J9202 (Goserelin acetate implant, per 3.6 mg), J9202 (Goserelin acetate implant, per 19.8 mg), (J1950 (Injection, leuprolide acetate (for depot suspension), per 3.75 mg), J9217 (Leuprolide acetate (for depot suspension), 7.5 mg), J9218 (Leuprolide acetate, per 1 mg), J9219 (leuprolide acetate implant 65 mg)
PSA: HCPCS Codes: 84153 (Prostate Specific Antigen (PSA); total), 84154 (Prostate Specific Antigen (PSA); free)
Cystoscopy: CPT codes: 52000 (Cystoscopy), 52005 (Cystoscopy and Ureter Catheter Cystouretheroscopy, with ureteral catheterization, with or without irrigation, instillation, or ereteropyelography, exclusive of radiologic service), 52007 (Cystoscopy and biopsy cystourethroscopy, with ureteral catheterization,with or without irrigation, instillation, ork ureteropyelography, exclusive of radiologic service; with brush biopsy of ureter and/or renal pelvis), 52204 (Cystoscopy with Biopsy(s), 52250 (Cystoscopy and radiotracer, Cystourethroscopy with insertion of radioactive substance, with or without biopsy or fulguration), 52260 (Cystoscopy and treatment, Cystouretheroscopy, with dilation of bladder for interstitial cystitis; general or conduction (spinal) anesthesia), 52265 (Cystoscopy and treatment, Cystourethroscopy, with dilation of bladder for enterstitial cystitis; local anesthesia), 52270 (Cystoscopy and revise urethra, Cystourethroscopy, with internal urethrotomy; Female), 52275 (Cystoscopy and Revise Urethra, Cystourethroscopy, with internal urethrotomy; Male), 52276 (Cystoscopy and treatment, Cystourethroscopy with direct vision internal urethrtomy), 52277 (Cystoscopy and treatment, Cystourethroscopy, with resection of external sphincter (sphincterotomy), 52281 (Cystoscopy and treatment, cystourethroscopy, with calibration and/or dilation of uretheral stricture or stenosis, with or without meatotomy, with or without injection procedure for cystography; Male or Female), 52283 (Cystoscopy and treatment, Cystourethroscopy, with steroid injection into stricture), 52285 (Cystoscopy and treatment, Cystourethroscopy for treatment of the female urethral syndrome with any or all of the following: Urethreal meatotomy, Urethral Dilation,Internal Urethrotomy, Lysis of Urethrovaginal Septal ibrosis, Lateral Incisions of the bladder neck, and fulguration of polyp(s) of urethra, bladder neck, and/or trigone), 52310 (Cystoscopy and treatment, Cystourethroscopy, with removal of foreign body, calculus, or ureteral stent from urethra or bladder (separate procedure); simple.